


REVISIONS

[illegible]

1. SCOPE

1.1 Scope. This drawing describes device requirements for class H hybrid microcircuits to be processed in accordance with MIL-H-38534.

1.2 Part or Identifying Number (PIN). The complete PIN shall be as shown in the following example:

5962-89594	01	X	X
Drawing number	Device type (See 1.2.1)	Case outline (See 1.2.2)	Lead finish per MIL-H-38534

1.2.1 Device type(s). The device type(s) shall identify the circuit function as follows:

Device type	Generic number	Circuit function
01	CLC231A	High speed, wideband, operational amplifier

1.2.2 Case outline(s). The case outline(s) shall be as designated in appendix C of MIL-M-38510, and as follows:

Outline letter	Case outline
X	See figure 1, (12-lead, .605" x .181"), can package

1.3 Absolute maximum ratings.

Supply voltage ($\pm V_{CC}$)	-----	± 20 V dc	
Output current	-----	± 100 mA	
Power dissipation (P_D)	-----	1/	
Thermal resistance, case-to-ambient (Θ_{CA})	-----	65° C/W 2/	
Thermal resistance, junction-to-case (Θ_{JC})	-----	48° C/W 3/	
	(Θ_{JC})	-----	100° C/W 4/
Junction temperature (T_J)	-----	+175° C	
Storage temperature range	-----	-65° C to +150° C	
Lead temperature (soldering, 10 seconds)	-----	+300° C	

1.4 Recommended operating conditions.

Supply voltage range	-----	± 5 V dc to ± 15 V dc
Gain range	-----	± 1 to ± 5
Ambient operating temperature range (T_A)	-----	-55° C to +125° C

- 1/ The power dissipation can be determined based on the application and junction temperature verified to be $T_J \leq +175^\circ\text{C}$ and using the thermal resistance values given.
- 2/ Still air, no heat sink.
- 3/ Thermal resistance of circuit; $P_{\text{circuit}} = 2(V_{CC}) I_{CC}$.
- 4/ Thermal resistance of output transistors; $P_{\text{output}} = V_{CE}(I_E) \times (\% \text{ duty cycle})$.

**STANDARDIZED
MILITARY DRAWING**
DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

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2. APPLICABLE DOCUMENTS

2.1 Government specifications and standard. Unless otherwise specified, the following specifications and standard of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATIONS

MILITARY

- MIL-M-38510 - Microcircuits, General Specification for.
- MIL-H-38534 - Hybrid Microcircuits, General Specification for.

STANDARD

MILITARY

- MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specifications, and standard required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with MIL-H-38534 and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-H-38534 and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 herein.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure .

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full specified operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table I.

3.5 Marking. Marking shall be in accordance with MIL-H-38534. The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in QML-38534 (see 6.6 herein).

3.6 Manufacturer eligibility. In addition to the general requirements of MIL-H-38534, the manufacturer of the part described herein shall submit for DESC-ECT review and approval electrical test data (variables format) on 22 devices from the initial quality conformance inspection group A lot sample, produced on the certified line, for each device type listed herein. The data should also include a summary of all parameters manually tested, and for those which, if any, are guaranteed.

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in QML-38534 (see 6.6 herein). The certificate of compliance submitted to DESC-ECT prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-H-38534 and the requirements herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-H-38534 shall be provided with each lot of microcircuits delivered to this drawing.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions <u>1/</u> $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Small signal bandwidth (-3 dB bandwidth)	SSBW		4,6	145		MHz
			5	120		
Gain flatness peaking low	GFPL	$f = 100\text{ kHz to } 50\text{ MHz}$	4		0.3	dB
			5,6		0.6	
Gain flatness peaking high	GFPH	$f > 50\text{ MHz}$	4		0.3	dB
			5		0.8	
			6		1.5	
Gain flatness rolloff	GFR	$f = 100\text{ MHz}$	4,6		0.6	dB
			5		1.0	
Linear phase deviation <u>2/</u>	LPD	$f < 100\text{ MHz}$	4,5,6		2	degree
Overshoot <u>2/</u>	OS	5 V step	4		10	%
			5,6		15	
Slew rate <u>2/</u> (overdriven input)	SR	10 V step	4,5,6	6		V/ns
Noninverting input <u>2/</u> capacitance	C_{IN}		4,5,6		2.5	pF
Noninverting input <u>2/</u> resistance	R_{IN}	$f = 100\text{ MHz}$	4	200		k Ω
			5	400		
			6	100		

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions <u>1/</u> $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
2nd harmonic distortion	HD2	0 dBm, $f = 20\text{ MHz}$	7,8A,8B		-47	dBc <u>3/</u>
3rd harmonic distortion	HD3	0 dBm, $f = 20\text{ MHz}$	7,8A,8B		-47	
Input offset voltage	V_{IO}		1		2.0	mV
			2,3		4.5	
Input offset voltage <u>2/</u> temperature coefficient	$\frac{\Delta V_{IO}}{\Delta T}$		2,3		25	$\mu\text{V}/^{\circ}\text{C}$
+ Input bias current <u>4/</u>	$+I_{IB}$	Input resistance is 100Ω	1		21	μA
			2,3		31	
+ Input bias current <u>2/</u> temperature coefficient	$\frac{\Delta +I_{IB}}{\Delta T}$		2,3		125	$\text{nA}/^{\circ}\text{C}$
- Input bias current	$-I_{IB}$	Input resistance is 49Ω	1	-15		μA
			2,3	-35		
- Input bias current <u>2/</u> temperature coefficient	$\frac{\Delta -I_{IB}}{\Delta T}$		2,3		200	$\text{nA}/^{\circ}\text{C}$
Power supply rejection ratio	PSRR	$\Delta V_{CC} = \pm 0.5\text{ V}$	1,2,3	45		dB
Supply current	I_{CC}	No load	1,2,3		22	mA
Common mode <u>2/</u> rejection ratio	CMRR	$\Delta V_{CM} = 1\text{ V}$	4,5,6	40		dB
Noise floor <u>2/</u>	SNF	$f > 5\text{ MHz}$	7,8A,8B		-150	dBm (1 Hz)
Integrated noise <u>2/</u>	INV	$f = 5\text{ MHz to } 200\text{ MHz}$	7,8A,8B		100	μA

1/ Unless otherwise specified, $R_L = 100.0\text{ ohms}$, $R_F = 250\text{ ohms}$, $\pm V_{CC} = \pm 15\text{ V}$, $A_V = +2$, and $V_{OUT} = 0.63\text{ Vp-p}$.

2/ Parameter shall be tested as part of device initial characterization and after design and process changes, which will affect this parameter. Parameter shall be guaranteed to the limits specified in table I for all lots not specifically tested.

3/ dBc is a standard reference for a signal referenced to a carrier signal level.

4/ In a noninverting configuration, care should be taken when choosing R_i , the input impedance setting resistor; the bias current is typically $5\text{ }\mu\text{A}$ but as high as $31\text{ }\mu\text{A}$ can create an input signal large enough to cause overload. It is recommended that $R_i < (V_{CC}/A_V)/31\text{ }\mu\text{A}$.

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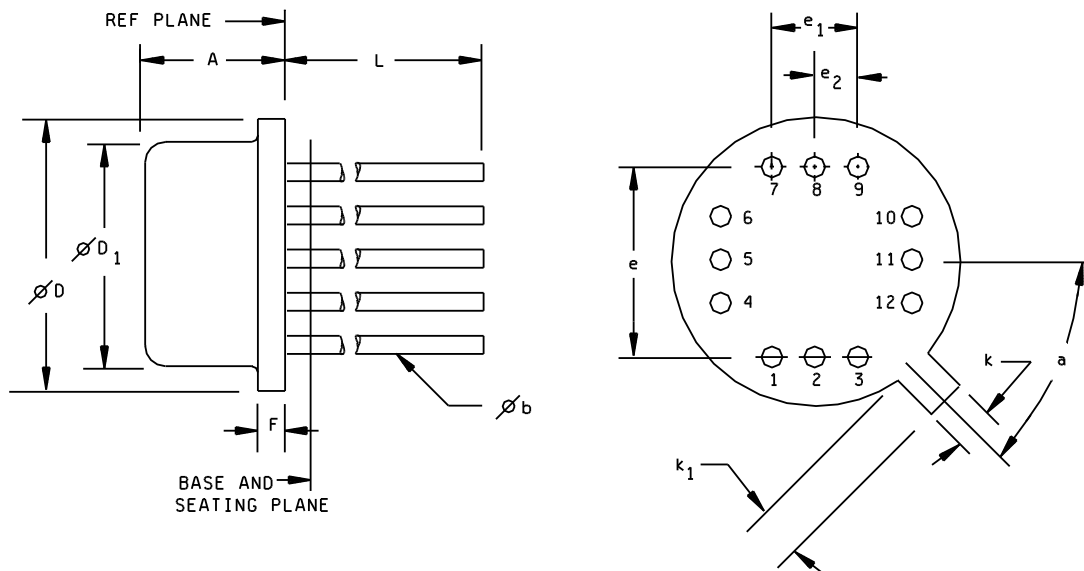


FIGURE 1. Case outline X.

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Symbol	Inches		Millimeters		Notes
	Min	Max	Min	Max	
A	.142	.181	3.61	4.60	
ϕb	.016	.019	0.41	0.48	
ϕD	.595	.605	15.11	15.37	
ϕD_1	.543	.555	13.79	14.10	
e	.400 BSC		10.16 BSC		5
e_1	.200 BSC		5.08 BSC		5
e_2	.100 BSC		2.54 BSC		5
F	.016	.030	0.41	0.76	
k	.026	.036	0.66	0.91	
k_1	.026	.036	0.66	0.91	4
L	.310	.340	7.87	8.64	
α	45° BSC		45° BSC		5

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. The product may be measured by direct methods or by gauge.
4. Measured from the maximum diameter of the product.
5. Leads having a maximum diameter .019 (0.48 mm) measured in gauging plane .054 (1.37 mm) $+0.001$ (0.03 mm), -0.000 (0.00 mm) below the base plane of the product shall be within .007 (0.18 mm) of their true position relative to a maximum width tab.

FIGURE 1. Case outline X - Continued.

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Device type	01
Case outline	X
Terminal number	Terminal symbol
1	+V _{CC} (supply voltage)
2	+I _{CC} adjust
3	GND (case)
4	No connection
5	-V _{IN}
6	+V _{IN}
7	GND (case)
8	-I _{CC} adjust
9	-V _{CC} (supply voltage)
10	-V _{CC} (collector supply)
11	V _{OUT}
12	+V _{CC} (collector supply)

NOTE: Pins 2 and 8 are used to adjust the supply current.
These pins are normally left unconnected. In normal use, a 250 ohms feedback resistor is connected externally between pins 5 and 11.

FIGURE 2. Terminal connections.

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4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-H-38534.

4.2 Screening. Screening shall be in accordance with MIL-H-38534. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.7 herein).

(2) T_A as specified in accordance with table I of method 1015 of MIL-STD-883.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5008, group A test table)
Interim electrical parameters	---
Final electrical test parameters	1*, 2, 3, 4, 7
Group A test requirements	1, 2, 3, 4, 5, 6, 7, 8A, 8B
Group C end-point electrical parameters	1

* PDA applies to subgroup 1.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-H-38534 and as specified herein.

4.3.1 Group A inspection. Group A inspection shall be in accordance with MIL-H-38534 and as follows:

a. Tests shall be as specified in table II herein.

b. Subgroups 9, 10, and 11 shall be omitted.

4.3.2 Group B inspection. Group B inspection shall be in accordance with MIL-H-38534.

4.3.3 Group C inspection. Group C inspection shall be in accordance with MIL-H-38534 and as follows:

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test conditions, method 1005 of MIL-STD-883.

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.7 herein).

(2) T_A as specified in accordance with table I of method 1005 of MIL-STD-883.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.3.4 Group D inspection. Group D inspection shall be in accordance with MIL-H-38534.

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5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-H-38534.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for original equipment design applications and logistic support of existing equipment.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-481 using DD Form 1693, Engineering Change Proposal (Short Form).

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronics devices (FSC 5962) should contact DESC-ECT, telephone (513) 296-6047.

6.5 Comments. Comments on this drawing should be directed to DESC-ECT, Dayton, Ohio 45444, or telephone (513) 296-5374.

6.6 Approved sources of supply. Approved sources of supply are listed in QML-38534. Additional sources will be added to QML-38534 as they become available. The vendors listed in QML-38534 have agreed to this drawing and a certificate of compliance (see 3.7 herein) has been submitted to and accepted by DESC-ECT.

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STANDARDIZED MILITARY DRAWING SOURCE APPROVAL BULLETIN

DATE: 92-01-22

Approved sources of supply for SMD 5962-89594 are listed below for immediate acquisition only and shall be added to QML-38534 during the next revision. QML-38534 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DESC-ECT. This bulletin is superseded by the next dated revision of QML-38534.

Military drawing part number	Vendor CAGE number	Vendor similar part number <u>1/</u>
5962-8959401XX	62839	CLC231A8C

1/ Caution. Do not use this number for item acquisition.
Items acquired to this number may not satisfy the
performance requirements of this drawing.

Vendor CAGE
number

62839

Vendor name
and address

Comlinear Corporation
4800 Wheaton Drive
Fort Collins, CO 80525-9483

The information contained herein is disseminated for convenience only and the Government assumes no liability whatsoever for any inaccuracies in this information bulletin.
